



### FEATURES

- Twin independent outputs
- Input/output isolation 1kVDC 'Hi Pot Test'
- Output/output isolation 1kVDC 'Hi Pot Test'
- Power sharing on outputs
- Efficiency to 80%
- 5V input
- One 5V output (V1)
- 5V, 12V and 15V output (V2)
- Internal SMD construction
- No external components required
- MTTF up to 1.6 million hours
- Custom solutions available

### DESCRIPTION

The NMD series of DC-DC converters are ideally suited to applications where a potential difference exists between loads, e.g. motor control circuits. The twin outputs offer cost and space savings by consolidating two DC-DC converters into one package. All of the rated power may be drawn from a single output provided the total load does not exceed 1 watt.

### SELECTION GUIDE

Order Code	Nominal Input Voltage	Output Voltage 1	Output Voltage 2	Output Current 1	Output Current 2	Efficiency	MTTF <sup>1</sup>	Package Style
	V	V	V	mA	mA	%	kHrs	
<b>In Production</b>								
<b>NMD050505SC</b>	5	5	5	100	100	70	1615	SIP
<b>NMD050512SC</b>	5	5	12	100	42	80	339	SIP
<b>NMD050515SC</b>	5	5	15	100	34	80	187	SIP
<b>Discontinued</b>								
<b>NMD050503DC</b>	5	5	3.3	100	152	70	1615	DIP
<b>NMD050512DC</b>	5	5	12	100	42	80	339	DIP
<b>NMD050515DC</b>	5	5	15	100	34	80	187	DIP
<b>NMD050503SC</b>	5	5	3.3	100	152	70	1615	SIP
<b>NMD120505DC</b>	12	5	5	100	100	70	489	DIP
<b>NMD120512DC</b>	12	5	12	100	42	80	229	DIP
<b>NMD120505SC</b>	12	5	5	100	100	70	489	SIP
<b>NMD050505DC</b>	5	5	5	100	100	70	1615	DIP
<b>NMD050509DC</b>	5	5	9	100	56	80	669	DIP
<b>NMD050509SC</b>	5	5	9	100	56	80	669	SIP
<b>NMD120509DC</b>	12	5	9	100	56	80	343	DIP
<b>NMD120515DC</b>	12	5	15	100	34	80	148	DIP
<b>NMD120509SC</b>	12	5	9	100	56	80	343	SIP
<b>NMD120512SC</b>	12	5	12	100	42	80	229	SIP
<b>NMD120515SC</b>	12	5	15	100	34	80	148	SIP

When operated with additional external load capacitance the rise time of the input voltage will determine the maximum external capacitance value for guaranteed start up. The slower the rise time of the input voltage the greater the maximum value of the additional external capacitance for reliable start up.

### INPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Voltage range	Continuous operation, 5V input types	4.5	5.0	5.5	V

### OUTPUT CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Rated power	T <sub>A</sub> =0°C to 125°C, see derating graph			1.0	W
Voltage set point accuracy	See tolerance envelope				
Line regulation	High V <sub>IN</sub> to Low V <sub>IN</sub> All output types		1.0	1.2	%/%
	10% load to rated load, 5V output types			15	
Load regulation	10% load to rated load, 12V output types			10	%
	10% load to rated load, 15V output types			10	
Ripple and noise	BW=DC to 20MHz, all output types			75	mV p-p

### ABSOLUTE MAXIMUM RATINGS

Short-circuit protection <sup>2</sup>	1 second
Lead temperature 1.5mm from case for 10 seconds	260°C
Input voltage V <sub>IN</sub> , NMD05 types	7V



For full details go to  
[www.murata-ps.com/rohs](http://www.murata-ps.com/rohs)

1. Calculated using MIL-HDBK-217F with nominal input voltage at full load.

2. Supply voltage must be disconnected at the end of the short circuit duration.

All specifications typical at T<sub>A</sub>=25°C, nominal input voltage and rated output current unless otherwise specified.

## ISOLATION CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	Flash tested for 1 second	1000			VDC
Resistance	$V_{iso} = 500\text{VDC}$	1			$\text{G}\Omega$

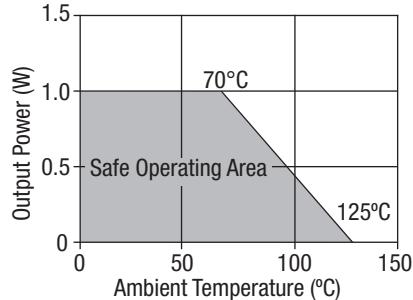
## GENERAL CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Switching frequency	All input types		100		kHz

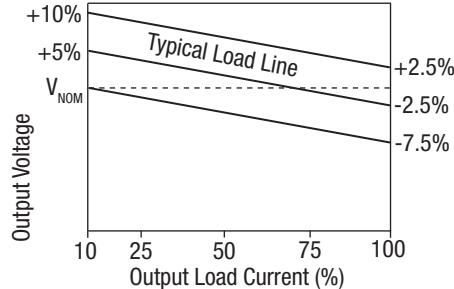
## TEMPERATURE CHARACTERISTICS

Parameter	Conditions	Min.	Typ.	Max.	Units
Specification	All output types	0		70	
Storage		-55		150	$^{\circ}\text{C}$
Cooling	Free air convection				

## TEMPERATURE DERATING GRAPH



## TOLERANCE ENVELOPE



## TECHNICAL NOTES

## ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

Murata Power Solutions NMD series of DC-DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

For a part holding no specific agency approvals, such as the NMD series, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

## REPEATED HIGH-VOLTAGE ISOLATION TESTING

It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The NMD series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enameled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognised parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

## RoHS COMPLIANCE INFORMATION



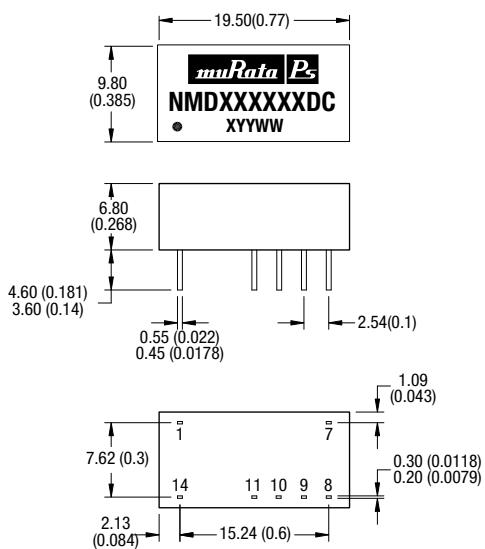
This series is compatible with RoHS soldering systems with a peak wave solder temperature of 260°C for 10 seconds. The pin termination finish on the SIP package type is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. The DIP types are Matte Tin over Nickel Preplate. Both types in this series are backward compatible with Sn/Pb soldering systems.

For further information, please visit [www.murata-ps.com/rohs](http://www.murata-ps.com/rohs)

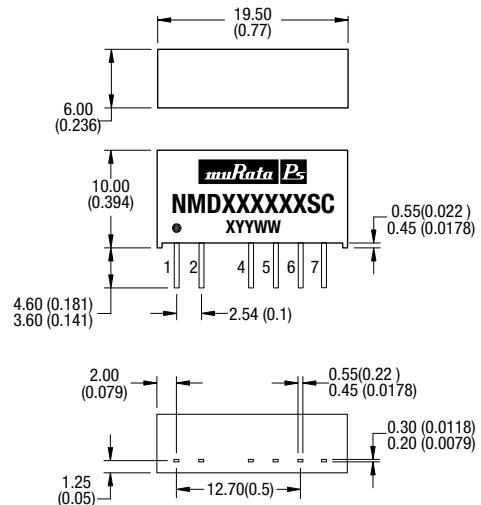
**PACKAGE SPECIFICATIONS**

**MECHANICAL DIMENSIONS**

DIP Package



SIP Package



All dimensions in mm  $\pm 0.25$ mm (inches  $\pm 0.01$ ). All pins on a 2.54 (0.1) pitch and within 0.25 ( $\pm 0.01$ ) of true position.

Weight: 2.3g (DIP & SIP)

**PIN CONNECTIONS - 14 PIN DIP**

Pin	Function
1	$-V_{IN}$
7	NC
8	$-V_{OUT2}$
9	$+V_{OUT2}$
10	$-V_{OUT1}$
11	$+V_{OUT1}$
14	$+V_{IN}$

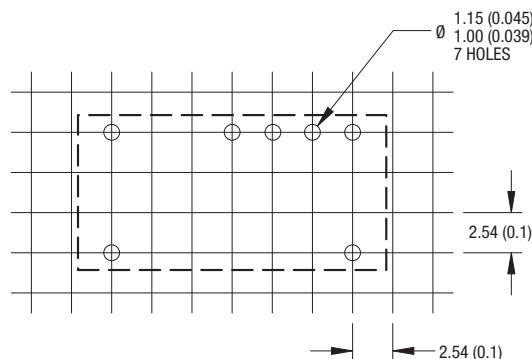
**PIN CONNECTIONS - 7 PIN SIP**

Pin	Function
1	$+V_{IN}$
2	$-V_{IN}$
4	$+V_{OUT1}$
5	$-V_{OUT1}$
6	$+V_{OUT2}$
7	$-V_{OUT2}$

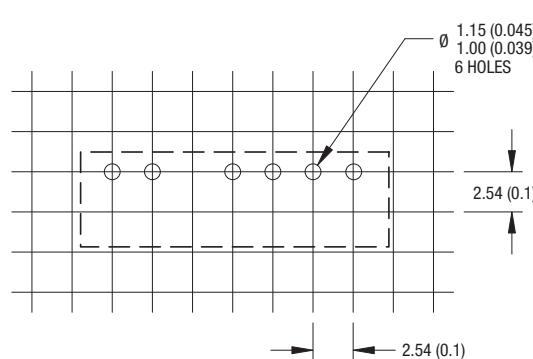
**PACKAGE SPECIFICATIONS (continued)**

**RECOMMENDED FOOTPRINT DETAILS**

14 Pin DIP Package

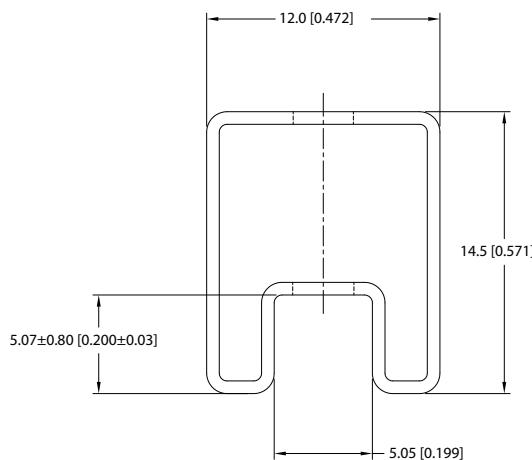


7 Pin SIP Package

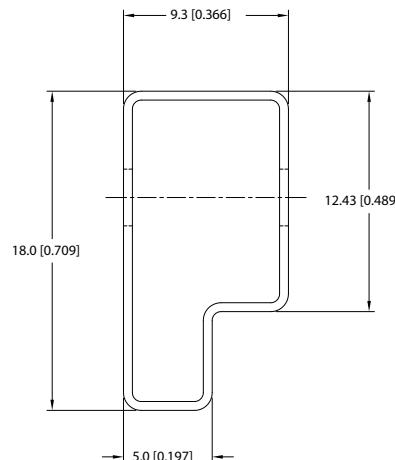


**TUBE OUTLINE DIMENSIONS**

14 Pin DIP Tube



7 Pin SIP Tube



Unless otherwise specified all dimensions in mm [inches]  $\pm 0.55\text{mm}$  [0.022].

Tube length (14 Pin DIP) : 520mm [20.472]  $\pm 2.0$  [0.079].

Tube length (7 Pin SIP) : 520mm [20.472]  $\pm 2.0$  [0.079].

Tube Quantity : 25



This product is subject to the following [operating requirements](#) and the [Life and Safety Critical Application Sales Policy](#). Refer to: <http://www.murata-ps.com/requirements/>

Murata Power Solutions, Inc. makes no representation that the use of its products in the circuits described herein, or the use of other technical information contained herein, will not infringe upon existing or future patent rights. The descriptions contained herein do not imply the granting of licenses to make, use, or sell equipment constructed in accordance therewith. Specifications are subject to change without notice.

© 2017 Murata Power Solutions, Inc.